CHBE 590

KINETICS, CATALYSIS, AND REACTION ENGINEERING

Fall 2016

Instructor

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Lectures: TR 1:00 - 2:15 PM - GRB W212
Office Hours: TR 4:30 - 5:30 PM

Course Contents

1. **Introduction**
2. **Stoichiometry**: Independent reactions; reaction and production rates; computational aspects.
3. **Material Balances for Chemical Reactors**: Batch, semi-batch, continuous stirred tank (CSTR) and plug flow reactors;
4. **Energy Balances for Chemical Reactors:** Steady-state multiplicity; limit cycles; hot spots and runaways.
5. **Fixed bed catalytic reactors:** Reaction and diffusion in isothermal and non-isothermal catalyst pellets; effectiveness factor; external mass transfer; dispersion; design of fixed-bed reactors; convection, diffusion, reaction models.
6. **Mixing in chemical reactors:** Residence time distribution; reactor mixing limits.

Textbook

J.B. Rawlings and J.G Eckerdt, “Chemical Reactor Analysis and Design.” Second Edition, Nob Hill Publishing (2013).

Homework Assignments

Homework problem sets will involve both theoretical analysis and computer programing. Students should use MATLAB for the solution of homework problems. A few recitation sessions will be held in the beginning of the semester to remind students how to use MATLAB to solve nonlinear systems of equations and integrate systems of differential equations.

Homework Policy

- Late homework will be penalized, unless prior permission has been obtained from the instructor.
- Homework that is more than four days late will not be accepted.
- Late homework will not be accepted after solutions have been posted.

Exams

There will be two in-class exams scheduled for October 13 and December 1.

Grading Policy

- Homework: 40%
- Exams: 60% (25% and 35%)

The raw scores earned for the homework and exams will be converted to T-scores. The final course grade will be assigned using the weighted averages of all the T-scores.

Honor Code Policy

Students may talk to each other, the course assistant(s), and the instructor about any assignment in the course that is not specifically designated as pledged. This assistance is limited to a discussion about the fundamental concepts involved in solving the problem. Students are not allowed to share computer codes and calculation details, or to consult another student's solution (even from a previous reaction engineering class) are prohibited. Submitted solutions to assignments may not be copied from any source.

ADA Statement

Any student with a documented disability needing academic adjustments or accommodations is requested to speak with the instructor during the first two weeks of class. All discussions will remain confidential. Students with disabilities will need to also contact Disability Support Services in the Ley Student Center.